

REMARKS

Claims 1-6, 8-18, 21-31, 33-43, 46-51, 53, 55 and 57-59 are pending. Claims 1-6, 8-18, 21-31, 33-43, 46-51, 53, 55 and 57-59 stand rejected. Claims 1, 13, 15, 24, 26, 38, 40, 46 and 57 have been amended. Applicant reserves the right to pursue the original claims in this and other applications. In view of the amendments to the claims and the remarks below, Applicant respectfully requests that the rejections be withdrawn and the claims be allowed.

Claims 1, 2, 4, 5, 8, 9, 11, 13-18, 24-27, 29, 30, 33, 34, 36, 38-41, 43, 46, 47, 49, 50, 53, 55 and 57-59 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,503,780 to Glenn et al. ("Glenn") in view of U.S. Patent Application Publication No. 2002/0057468 to Segawa et al. ("Segawa"). The rejection is respectfully traversed.

Claim 1 relates to a microelectronic imaging unit that includes a microelectronic die and a cover unit. The imaging unit also includes "electrically conductive interconnects extending vertically through the cover unit above the die and/or through the die, the interconnects being electrically coupled to corresponding terminals." As an example, Figures 2A and 5 of the application clearly demonstrate the orientation of the electrically conductive interconnects. In Figure 2A, shown below, the microelectronic die is shown by reference number 210. The electrically conductive interconnects 226 pass through the die and are connected to bond pads 222 and ball pads 224. Also, in Figure 5, shown below, the electrically conductive interconnects 526 extend vertically through the cover unit 560 above the die 510. As a result, "[t]he footprint of the microelectronic imager can be nearly as small as the size of the die because the die is not mounted to a separate interposer substrate. This is possible because the interconnects provide an electrical connection to an array of ball-pads ... instead of using wire-bonds." Application, ¶ [0034]. As explained below, neither

Glenn nor Segawa, individually or combined, teach or suggest at least this element of the imaging unit recited by claim 1.

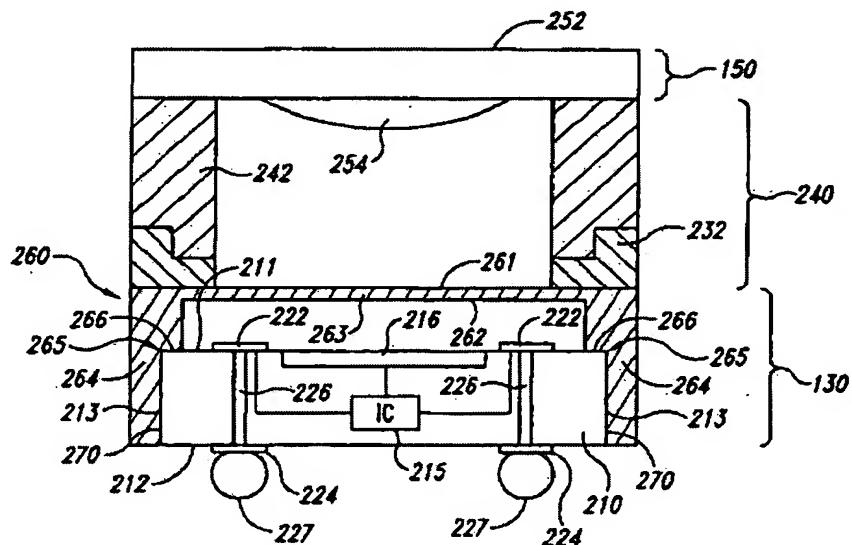


Fig. 2A

Application, Figure 2A.

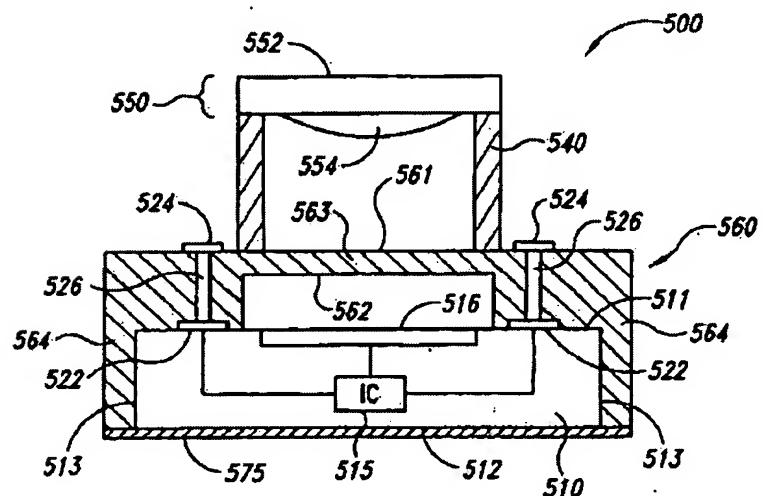


Fig. 5

Application, Figure 5.

Glenn relates to an image sensor package fabrication method. Glenn, Abstract. In Figure 14, shown below, Glenn shows an integrated circuit 102 with bond wires 1406 connecting the top of the integrated circuit 102 to traces 1404. Glenn does not show any electrical interconnects passing either through the integrated circuit or through a cover unit above the integrated circuit. In fact, by using bond wires, Glenn teaches away from a stated purpose of the Application for using electrically conductive interconnects. In the application, the reducing of the microelectronic imager footprint is a specific result of using electrically conductive interconnects either through the die or extending vertically above the die. Application, ¶ [0034]. Because Glenn fails to teach or suggest this element, Glenn fails to render claim 1 unpatentable.

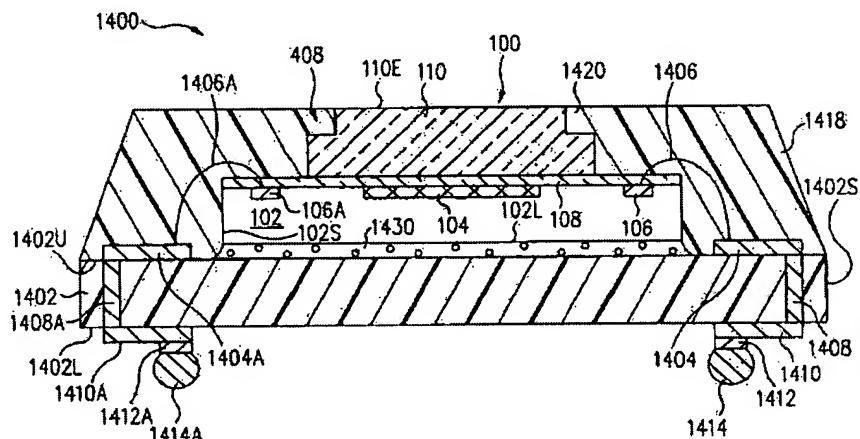


FIG. 14

Glenn, Figure 14.

Segawa does not remedy the inadequacies of Glenn. Segawa's Figure 2, shown below, shows a camera module that includes a photoelectric conversion element 7. The photoelectric conversion element 7 is in electrical connection with spring electrode 15 via terminal 8b. There is, however, no teaching or suggestion in Segawa of an interconnect "extending vertically through the cover unit above the die and/or through the die," as recited in claim 1 of the Application.

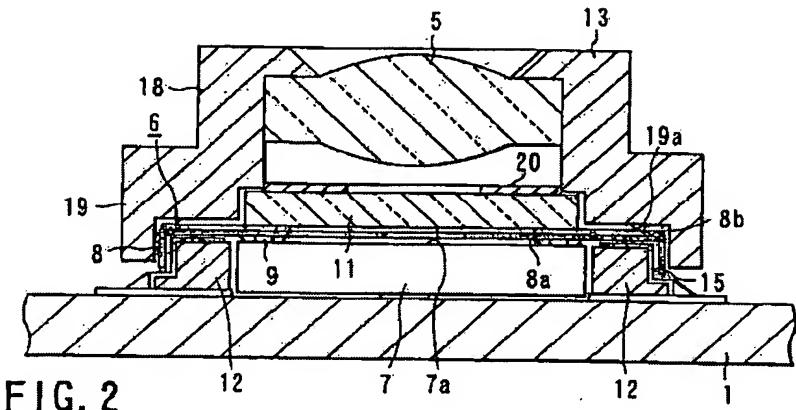


FIG. 2

Segawa, Figure 2.

Because neither Glenn nor Segawa, individually or combined, show “electrically conductive interconnects extending vertically through the cover unit above the die and/or through the die,” the combination of Glenn and Segawa fails to render claim 1 unpatentable. Claims 2, 4, 5, 8, 9, 11, 13 and 14 depend from claim 1 and are thus allowable for at least the same reason claim 1 is allowable.

Independent claims 15 and 26 both relate to a microelectronic imaging unit and independent claim 40 relates to a plurality of microelectronic imagers. Claims 15 and 26 recite “electrically conductive interconnects ... extending vertically through the cover unit above the die and/or through the die.” Similarly, claim 40 recites “electrically conductive interconnects extending vertically through the individual cover units above the dies and/or through the individual dies.” As explained above, neither Glenn nor Segawa teaches or suggests at least these elements of claims 15, 26 and 40. Accordingly, claims 15, 26 and 40 are not rendered unpatentable by the combination of Glenn and Segawa. Claims 16-18, 24 and 25 depend from claim 15 and are allowable for at least the same reason claim 15 is allowable. Claims 27, 29, 30, 33, 34, 36, 38 and 39 depend from claim 26 and are allowable for at least the same reason claim 26 is

allowable. Claims 41 and 43 depend from claim 40 and are allowable for at least the same reason claim 40 is allowable.

Claim 46 recites a method of packaging a microelectronic imager. Claim 57 recites a method of packaging a plurality of microelectronic imagers. Claim 46 recites "forming a plurality of electrically conductive interconnects ... extending through the die and/or vertically through the cover unit above the die." Claim 57 recites "forming a plurality of electrically conductive interconnects extending through individual dies and/or vertically through the cover units above the dies." As explained above, neither Glenn nor Segawa teaches or suggests at least these elements of claims 46 and 57. Accordingly, claims 46 and 57 are not rendered unpatentable by the combination of Glenn and Segawa. Claims 47, 49, 50, 53 and 55 depend from claim 46 and are allowable for at least the same reason that claim 46 is allowable. Claims 58 and 59 depend from claim 57 and are allowable for at least the same reason that claim 57 is allowable.

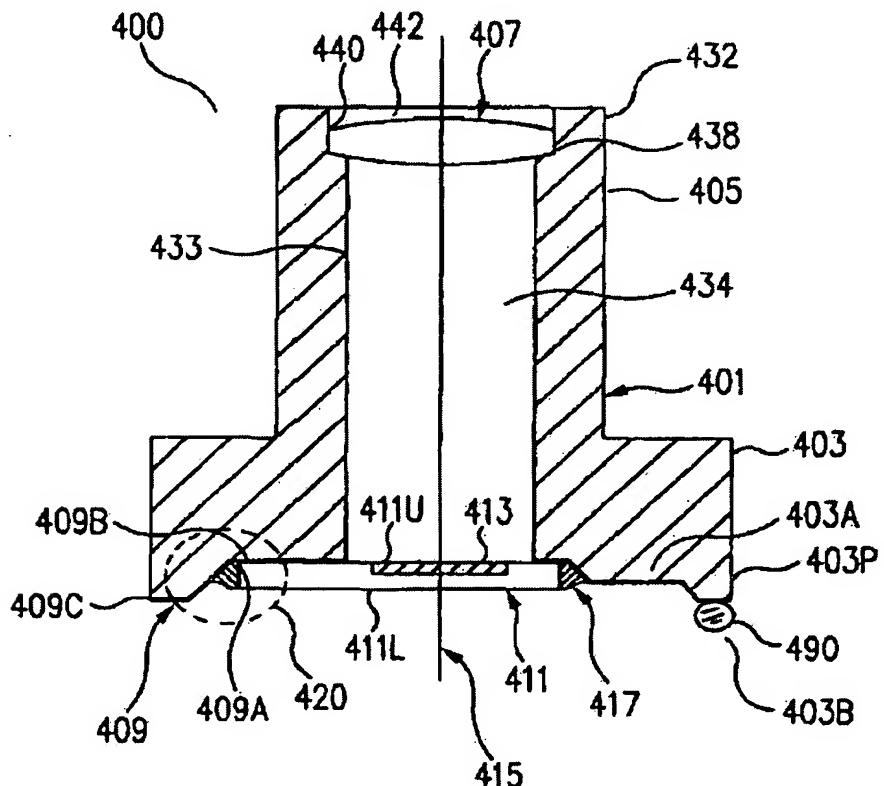
Because the combination of Glenn and Segawa fails to teach each of the elements of claims 1, 2, 4, 5, 8, 9, 11, 13-18, 24-27, 29, 30, 33, 34, 36, 38-41, 43, 46, 47, 49, 50, 53, 55 and 57-59, these claims are allowable over the combination of Glenn and Segawa. Applicant respectfully requests the rejection be withdrawn and the claims be allowed.

Claims 3, 6, 28, 31, 42, 48 and 51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Glenn and Segawa and further in view of U.S. Patent No. 6,734,419 to Glenn et al. ("Glenn '419"). The rejection is respectfully traversed.

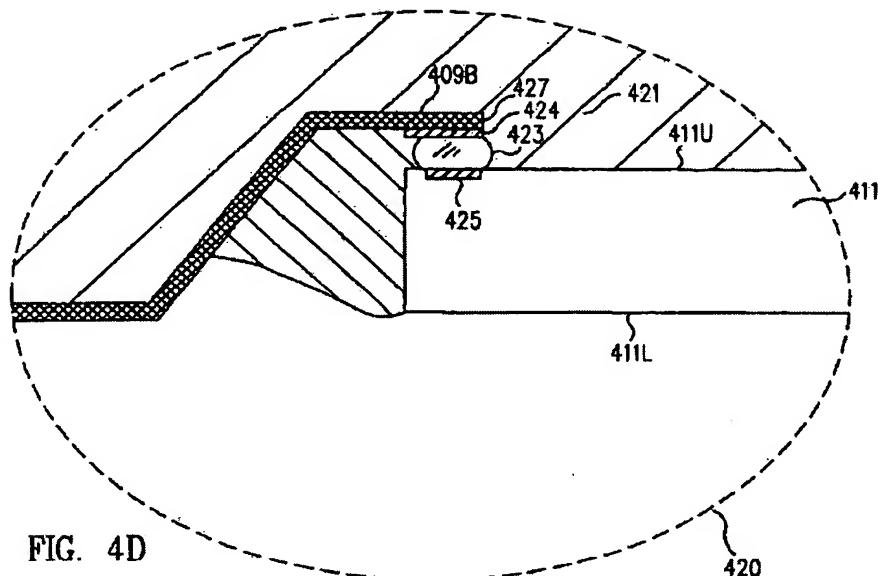
As explained above, neither Glenn nor Segawa, individually or combined, render independent claims 1, 26, 40 and 46 unpatentable. Claims 3 and 6 depend from

claim 1. Claims 28 and 31 depend from claim 26. Claim 42 depends from claim 40. Claims 48 and 51 depend from claim 46. Thus, the combination of Glenn and Segawa fails to render claims 3, 6, 28, 31, 42, 48 and 51 unpatentable.

Glenn '419 shows in Figures 4A and 4D, shown below, that the image sensor die 411 is connected via contacts 425, 424 and solder bump 423 to a Land Grid Array 409 for making external connections with the solder ball 490. Glenn '419 does not, however, teach or suggest any electrically conductive interconnects extending vertically through the cover unit above the die and/or through the die. On the contrary, Glenn '419 teaches electrical connections that extend horizontally from the image sensor die 411.



Glenn '419, Figure 4A.



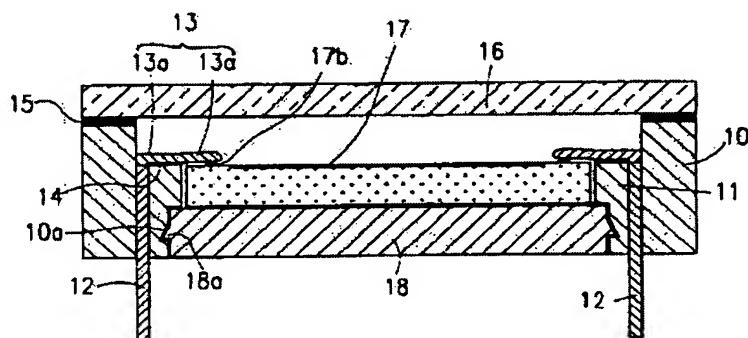
Glenn '419, Figure 4D.

Because neither Glenn, Segawa nor Glenn '419 teach or suggest every element of the independent claims from which claims 3, 6, 28, 31, 42, 48 and 51 depend, claims 3, 6, 28, 31, 42, 48 and 51 are allowable for at least the same reasons for which their corresponding independent claims are allowable. Applicant respectfully requests the rejection be withdrawn and the claim be allowed.

Claims 10, 12, 21-23, 35 and 37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Glenn and Segawa and further in view of U.S. Patent No. 5,753,857 to Choi ("Choi"). The rejection is respectfully traversed.

As explained above, neither Glenn nor Segawa, individually or combined, teach or suggest each element of independent claims 1, 15 and 26. Claims 10 and 12 depend from claim 1. Claims 21-23 depend from claim 15. Claims 35 and 37 depend from claim 26. Thus, the combination of Glenn and Segawa also fails to teach or suggest each element of claims 10, 12, 21-23, 35 and 37.

Referring to Figure 2 of Choi, reproduced below, Choi teaches that a package chip 17 is electrically connected to outleads 12 via a plate 13 and a solder ball 17b. However, Choi fails to teach or suggest any electrically conductive interconnects extending vertically through the cover unit above the die and/or through the die. On the contrary, Choi teaches electrical connections that extend around the package chip 17.



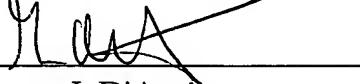
Choi, Figure 2.

Because neither Glenn, Segawa nor Choi teach or suggest every element of the independent claims from which claims 10, 12, 21-23, 35 and 37 depend, claims 10, 12, 21-23, 35 and 37 are allowable for at least the same reasons for which their corresponding independent claims are allowable. Applicant respectfully requests the rejection be withdrawn and the claim be allowed.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

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